

Claims

Claimed is:

1. Equipment for the treatment of fecal containing sludge with a fecal material receiving station (1), therein characterized, in that an apparatus is in the subject equipment (6) for the separation of sludge and filtrate.
2. Equipment in accord with the previous claim, therein characterized, in that a basin (7, 10) is provided for the equipment (6) for the collection of the filtrate and the dewatered sludge.
3. Equipment in accord with one or more of the foregoing claims, therein characterized, in that following the filtrate basin (10), is placed a biological wastewater purification system.
4. Equipment in accord with one or more of the foregoing claims, therein characterized, in that the biological wastewater treatment purification system possesses an aeration basin (11) and a secondary clarification basin (12).
5. Equipment in accord with one or more of the foregoing claims, therein characterized, in that the secondary clarification basin (12) has an outlet connection to a general main conduit.
6. Equipment in accord with one or more of the foregoing claims, therein characterized, in that a connection between the secondary clarifier (12) and the aerator basin (11) for the transport of thickened sludge (14) is placed as an outlet from the said secondary clarifier (12) and as an inlet into the aerator basin (11).
7. Equipment in accord with one or more of the foregoing claims, therein characterized, in that in the secondary clarifier (12) a removal system (15) for entrained sludge is placed.
8. Equipment in accord with one or more of the foregoing claims, therein characterized, in that in the secondary clarifier (12) a restraining means (16) of floating waste is placed.
9. Equipment in accord with one or more of the foregoing claims, therein characterized, in that in regard to the secondary clarifier (12), a wastewater filtration unit (13) is installed before the outlet to the main conduit.
10. Equipment in accord with one or more of the foregoing claims, therein characterized, in that a connection is established respectively between the secondary clarifier (12), wastewater filtration means (13) and the fecal material receiving station (1) or the fecal material storage tank (5) for transport of secondary sludge (14) out of the secondary clarifier (12) and the

sludge from the wastewater filter (13) into the fecal receiving station (1) or the fecal storage (5).

11. Equipment in accord with one or more of the foregoing claims, therein characterized, in that the equipment (6) is a worm press for the separation of sludge (8) and filtrate (9).
12. Equipment in accord with one or more of the foregoing claims, therein characterized, in that at the fecal material receiving station (1) an apparatus (2) is placed for the separation of the fecal containing sludge from rough solid materials.
13. A membrane unit for the clarification of wastewater, which encompasses a membrane module (106) and a wash chamber (105) located underneath said membrane module (106) with an air connection, by means of which the cleaning air can be injected into the membrane module (106), wherein the membrane module (106) possesses fittings for wastewater feed and permeate outlet, therein characterized, in that a sieve (108, 110) is placed between the said wash chamber (105) and membrane module (106) for the apportionment of cleaning air over the entire membrane module (106) and/or for the retention of larger entrained solid particulate in the wastewater feed into the membrane module (106).
14. A membrane unit in accord with the foregoing claim, therein characterized, in that the sieve (108, 110) consists of a perforated metal piece, a mesh and/or a separating filter.
15. A membrane unit in accord with one or more of the foregoing claims, therein characterized, in that a sieve (110) for the wastewater inflow is placed above a sieve (108) for the inflow of air.
16. A membrane unit in accord with one of the foregoing claims, therein characterized, in that the sieve (110) for the feed of wastewater is essentially positioned vertically.
17. A membrane unit in accord with one of the foregoing claims, therein characterized, in that the sieve (108) for the feed of air is essentially positioned horizontally.
18. A membrane unit in accord with one of the foregoing claims, therein characterized, in that for the membrane unit (103), there is supplied a separate, finely porous aerator (111) for furnishing oxygen to bacteria in the wastewater.

19. A membrane unit in accord with one or more of the foregoing claims, therein characterized, in that the aerator (111) possesses openings in an air hose to produce finely porous aeration of the wastewater.
20. A membrane unit in accord with one or more of the foregoing claims, therein characterized, in that the position of the aerator (111), relative to the membrane unit (103) is changeable in all directions.
21. A membrane unit in accord with one of the foregoing claims, therein characterized, in that the wash chamber (105) possesses openings (114) for the removal of sludge.
22. A membrane unit in accord with one or more of the foregoing claims, therein characterized, in that the membrane unit (103) is placed on a carrying frame (117).
23. A membrane unit in accord with one or more of the foregoing claims, therein characterized, in that the carrying frame (117) is designed to permit its suspension or construction within a basin, especially in a wastewater basin.
24. A membrane unit in accord with one or more of the foregoing claims, therein characterized, in that the carrying frame (117) possesses an apparatus for the elevation adjustment of the membrane unit (103) in the basin, the basin being especially at ground level.
25. Equipment for the clarification of wastewater encompassing a membrane unit (103), especially in accord with one of the claims 1 to 7, a permeate pump (123), which is connected with a permeate line (109) of the membrane unit (103), and an equipment control, therein characterized
in that the equipment possesses at least one basin with an entry for wastewater and in the said basin is to be found a level controller, and
in that the equipment control (130) is in communication with the permeate pump (123) and the level controller and controls the permeate pump (123) in relation to the level of water in the said basin by switching the same ON or OFF or operating it with a varied flow delivery and/or by activating an additional pump.
26. Equipment in accord with one of the foregoing claims, therein characterized, in that the equipment has only one basin, in particular a ground level basin for rough solid materials and wastewater.

27. Equipment in accord with the foregoing claim, therein characterized, in that the basin of a multichamber basin (101), especially the the final basin, is an activated basin.
28. Equipment in accord with one of the foregoing claims, therein characterized, in that a flow meter (125) is provided in the permeate line (109) and said flow meter is in communication with the equipment control (130).
29. Equipment in accord with one of the foregoing claims, therein characterized, in that a filter (122) is placed in the permeate line (109).
30. Equipment in accord with one of the foregoing claims, therein characterized, in that the permeate pump (123) is a self priming pump (123).
31. Equipment in accord with one of the foregoing claims, therein characterized, in that a blower (120, 121) is connected to the air entry connection of the wash chamber (105) of the membrane module (106) and/or to the aerator (111).
32. Equipment in accord with one of the foregoing claims, therein characterized, in that the level control instrument is a float (104).
33. Equipment in accord with one of the foregoing claims, therein characterized, in that for the increase of the capacity of the permeate pump (123) an additional outlet flow line (127) is provided from the said pump.
34. Equipment in accord with one of the foregoing claims, therein characterized, in that the additional outlet line (127) possesses a controlled outlet valve (128).
35. Equipment in accord with one of the foregoing claims, therein characterized, in that, respectively, a throttling valve is provided in the outlet line(s) (124, 127).
36. Equipment in accord with one of the foregoing claims, therein characterized, in that the control system (130) can emit a disturbance signal.
37. A method for the operation of such equipment as is in accord with one or more of the claims 25 to 36, whereby, in one basin or in a specially existing basin i.e., the last basin is designed to serve as an activated basin in which a membrane module (106) is installed, and which, by the feed of oxygen and microorganisms the therein contained wastewater is biologically

purified, the mixture of biological (living) sludge and cleaned wastewater is physically separated by means of an ultra filtration membrane of the membrane module (106) and the clarified water, is removed by the suction of a permeate pump (123), therein characterized, in that in relation to the level of water in the said basin the operation of the permeate pump (123) is controlled, whereby the permeate pump (123) is switched to ON/OFF positions, is driven with different delivery flows and/or an auxiliary pump is activated.

38. A method in accord with the forgoing claim, therein characterized, in that a plurality of water levels may be determined.
39. A method in accord with one of the forgoing claims, therein characterized, in that up to the first deeper water level, the permeate pump (123) is switched off.
40. A method in accord with one of the forgoing claims, therein characterized, in that between the first deeper and a second higher water level, the permeate pump (123) is operated with a normal delivery flow.
41. A method in accord with one of the forgoing claims, therein characterized, in that above the second water level, the permeate pump (123) is operated at an increased capacity.
42. A method in accord with one of the forgoing claims, therein characterized, in that above the second water level an auxiliary outlet line from the permeate pump (123) is opened.
43. A method in accord with one of the forgoing claims, therein characterized, in that the quantity of transported permeate is steplessly controlled to be in accord with the water level.
44. A method in accord with one of the forgoing claims, therein characterized, in that an aerator (111) of the basin is operated in accord with the water level.
45. A method in accord with one of the forgoing claims, therein characterized, in that the aerator (111) is operated with pauses.
46. A method in accord with one of the forgoing claims, therein characterized, in that cleaning air is operated in accord with the water level.
47. A method in accord with one of the forgoing claims, therein characterized, in that the functionality of the equipment is monitored by a flow meter (125).

48. A method in accord with one of the forgoing claims, therein characterized, in that upon a disturbance of the equipment, a sender (131) of a distress signal is activated.
49. A method in accord with one of the forgoing claims, therein characterized, in that upon a disturbance of the equipment, a self-correction repair system is activated.
50. A method in accord with one of the foregoing claims, therein characterized, in that for the self-correction repair system a cleansing program is initiated.
51. A method in accord with one of the foregoing claims, therein characterized, in that the cleaning program, the permeate pump (123), and/or the aerator, and/or the cleaning air will be intermittently operated.
52. A method in accord with one of the forgoing claims, therein characterized, in that in a case of a disturbance of the equipment, the permeate pump (123) and/or the aerator and/or the cleaning air are at least temporarily stopped from operation.
53. A method in accord with one of the foregoing claims, therein characterized, in that with measurement readings of pressure, oxygen quantity, degree of purification, and/or turbidity of the permeate, the functionality of the equipment is determined.
54. A method in accord with one of the forgoing claims, therein characterized, in that for the measurement of turbidity, a sight glass is used.
55. A method in accord with one of the forgoing claims, therein characterized, in that for the measurement of turbidity, photometric means can be used.
56. A method in accord with one of the forgoing claims, therein characterized, in that the measurement of the degree of cleaning of the permeate can be carried out by means of CSB testing, i.e., chemical deficiency of oxygen determination.